Ballast water purification system(ClearBallast)

Our ballast water purification systems for ships protect ocean ecosystems and contribute to global environmental preservation.

Overview

Ballast water is sea water used to stabilize hull balance when unloading cargoes. Such sea water contains local plankton, bacteria, viruses, mud and sand of the unloading port where the ballast water is taken.
As the ballast water is discharged together with the plankton, etc. at another port, it possibly impacts the ecosystem in the sea area, causing a global-scale environmental damage.
To overcome this problem, IMO (International Maritime Organization) stipulates all new ships from 2012 (with all ships fitted by 2017) to install Ballast Water Management System on board which shall meet the Standard on the water quality.
Our system adopts the “Coagulation & Magnetic Separation Method” and realizes an environmentally-friendly water purification technology which requires no toxic chemicals. Consequently, there is no risk of marine pollution which could be caused by residual toxic chemicals. Furthermore it can also significantly reduce mud sediment in Ballast Tank.

Features

1. **No restriction on ballast water discharge operation**
   Ballast water is purified at intake, so smooth unloading and the gravity discharge can be performed without any restriction as no treatment is required when discharging water.
2. **Greatly reduces mud sediment in Ballast Tank**
   By adopting coagulation method, our system can not only efficiently collect plankton, bacteria and mud but also greatly reduce mud sediment in Ballast Tank.
3. **No byproduct caused by chemicals**
   As our system uses neither biological toxicity nor neutralizing chemical, no harmful byproduct is generated by chemicals.
4. **No need to inject chemicals when discharging ballast water**
   In the biological toxicity tests conducted according to the IMO convention, the water treated by our system has been confirmed to have no impact on organisms even if it is discharged without being diluted. Our system requiring no chemicals at discharge of ballast water can be said to be an environmentally-friendly system.
5. **Does not damage coatings inside the ballast tank or pipes**
   Because no oxidant is included in the additive agents used in our system, there is no concern about the damage on the coatings inside the ballast tank and pipes.
6. **Water salinity does not make an impact on this system treatment**
   Our system where “coagulation”, “magnetic separation” and “filter separation”

Social Infrastructure & Industrial Machinery Systems
Environmental Systems
- Drinking water treatment systems
- Sewage treatment systems <Pre-treatment/water treatment facilities>
- Sewage treatment systems <Sludge treatment facilities/others>
- Industrial water treatment systems
- Oil & Gas Industrial Water Treatment System
- Ballast water purification system(ClearBallast)
- Introduction to overseas business
- Industrial clean rooms
- Biological clean rooms
- Building air conditioning systems
- Energy conservation systems
- Originally developed devices
- Total engineering for food and chemical plants

Mechatronics
Industrial Plant Systems
Energy Systems

technologies are combined is not affected by the water salinity, so it can provide superior performance in any water area including seawater, brackish water and fresh water.

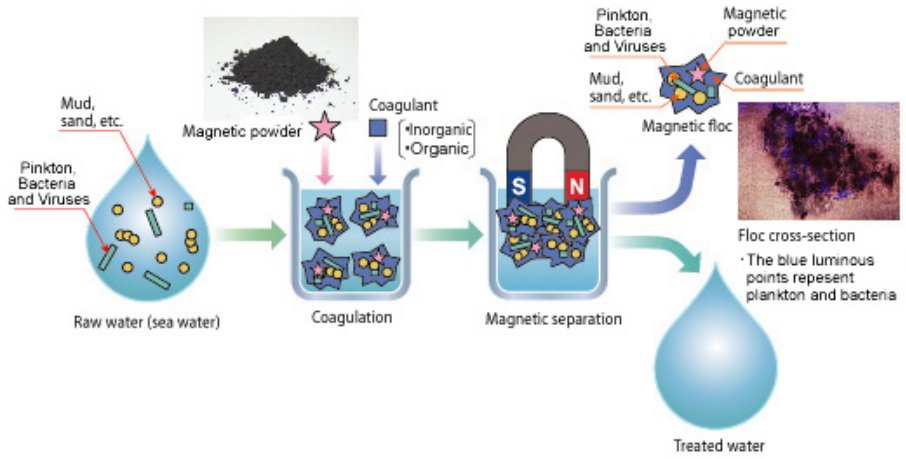
7. **Low power consumption**
   Our system is energy conservation type, so it realizes low power consumption.
8. **Easy explosion prevention**
   Explosion-proof measures are necessary only around the motor area.

Telephone inquiries

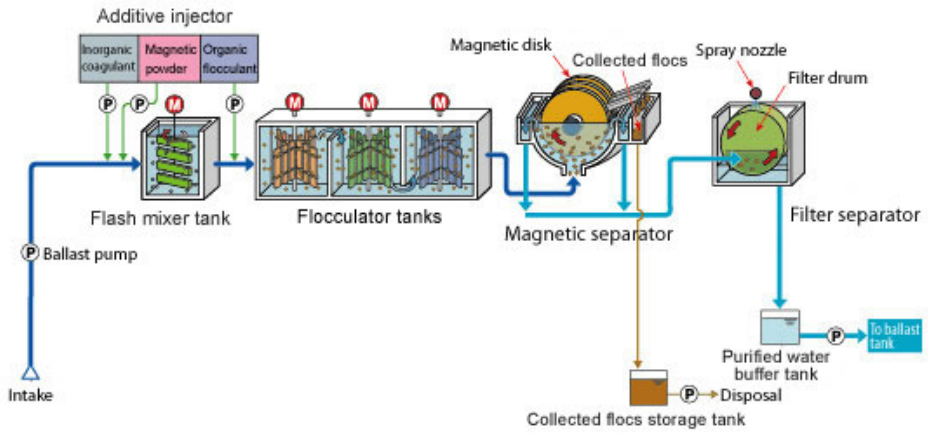
System Overview

Pre-treatment using coagulation technology

Hitachi Coagulation Process, by mixing coagulants and magnetic powder into seawater taken by Ballast Pump, forms Magnetic Flocs that include Plankton, viruses and other microorganisms as well as mud and sand.

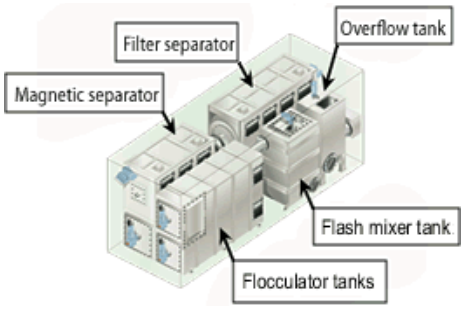


Process outline



System flow

An example of land-based test result (in brackish water region) [PSU: 23]



Device diagram

On-board example

Item	D-2 Standard Requirement	Untreated water	Treated water	Control
Microorganism greater than 50μm (microorganisms/□)	<10	269,500	<10	240,666
Microorganism from 10 to 50μm (microorganisms/ml)	<10	2,064	<10	888
Toxicogenic Vibrio Cholerae (O1, O139) (cfu/100ml)	<1	<1	<1	<1
Escherichia coli (cfu/100ml)	<250	1,596	<250	320
Intestinal Enterococci (cfu/ml)	<100	<100	<100	<100

* PSU: Practical Salinity Unit
* For untreated water, the data is water quality immediately before starting treatment (immediately after intake). For treated water and control, the data is water quality after 5 days.

An example of onboard test result (in seawater region) [PSU: 31]

Item	D-2 Standard Requirement	Untreated water	Treated water	Control
Microorganism greater than 50μm (microorganisms/□)	<10	31,603	<1	8,392
Microorganism from 10 to 50μm (microorganisms/ml)	<10	155	<1	15
Toxicogenic Vibrio Cholerae (O1, O139) (cfu/100ml)	<1	<1	<1	<1
Escherichia coli (cfu/100ml)	<250	<250	<250	<250
Intestinal Enterococci (cfu/ml)	<100	<100	<100	<100

* PSU: Practical Salinity Unit
* For untreated water, the data is water quality immediately before starting treatment (immediately after intake). For treated water and control, each data is water quality after 5 days.

Specification

Ballast Pump Capacity (m^3/h)	Footprint (m^2) *1							Electric Power (kW)
	Coagulation Tank	Flocculation Tank (Vertical Blade)	Magnetic Separator	Filter Separator	Additive Processing Unit *2	Collected Flocs Heating Equipment	Control panel	
200	1.2	3.3	4.2	4.3	4.5	1.4	1.2	21
400	1.8	3.7	6.8	7.5	8.3	1.4	1.2	31
800	2.5	11	14	16	8.3	2.3	2.0	56
1,200	5.4	16	27	28	17	4.6	2.8	85
1,600	5.0	22	29	32	17	4.6	2.8	112
2,400	11	32	53	56	44	9.2	4.0	170

*1 Indicates the footprint of each component.

*2 Includes the magnetic powder injector, inorganic coagulant injector and organic flocculant injector.

Notes:
As this system enables flexible equipment layout plans depending on ship's structure, please contact us for details.

1. Equipment can be divided into some parts and installed apart from each other, if the installation area is limited.
2. For one of the countermeasures against the limited installation area problem, it is also feasible to utilize a water tank including a ballast tank unused as an alternative for a coagulator tank, flocculator tanks or a collected flocs heating equipment.
3. The flocculation tank be rotated 90 degrees and installed as option.
4. Then the flocculation tank, the magnetic separator and the filter separator can be installed in a vertical formation.

Applications

Shipping field

* ClearBallast is a registered trademark of Hitachi Plant Technologies, Ltd. in Japan.

page top